REMARKS

The present response is intended to be fully responsive to all points of objection and/or rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Applicants assert that the present invention is new, non-obvious and useful. Prompt consideration and allowance of the claims is respectfully requested.

Status of Claims

Claims 1 – 34 are pending in the application. Claims 14 – 17, 23 – 33 have been objected to. Claims 1 – 13, 18 – 22, and 34 have been rejected. Claims 1, 7, 17 – 20, 24 – 25, and 29 – 33 have been amended.

Claim 34 has been canceled without prejudice or disclaimer. In making this cancellation without prejudice, Applicants reserve all rights in these claims to file divisional and/or continuation patent applications.

Applicants respectfully assert that the amendments to the claims add no new matter.

CLAIM OBJECTIONS

Claims 14 – 17, 23 – 33 have been objected to on the grounds of being multiple dependent claims. A Preliminary Amendment was filed on 4/6/2006 along with the initial submission of the National Phase of the present application. In that amendment, claims 13 and 22 were amended so that neither is a multiple dependent claim, and thus claims 14 – 17 and 23 – 33 are no longer dependent on a multiple dependent claim. In view of the foregoing amendments and remarks, the pending claims (14 – 17, 23 – 33) are deemed to be allowable. Their favorable reconsideration and allowance is respectfully requested.

CLAIM REJECTIONS

35 USC § 112 Rejections

In the Office Action, the Examiner rejected claims 19 – 20 and 22 under 35 USC § 112, second paragraph, as being indefinite in that they fail to point out what is included or excluded by the claim language. Claims 19 – 20 have been amended. Applicants respectfully assert that these amendments traverse this objection in light of the remarks that follow.

In the original patent, claims 19 and 20 were described solely in terms of Figures 9 and 10 of the patent application. These two claims have now been amended in such a way as to provide a detailed description of the embodiment being claimed. Literal support for the revised claims can be found in paragraphs 0091 and 0092 of the specification. While the phased array antennas depicted in the figures represent a specific embodiment in which there are 4 radiating elements, the specification discloses that the invention applies to the general case of n radiating elements or an $n \times m$ array in which n and m can have any integer value greater than 1.

Claim 22 was rejected on the grounds that it depends on claim 20, which was itself rejected under the second paragraph of 35 U.S.C. 112. Applicant respectfully submits that as claim 20 as amended now traverses the Examiner's objection, dependent claim 22 now traverses the objection as well.

In view of the foregoing amendments and remarks, the pending claims are deemed to be allowable. Their favorable reconsideration and allowance is respectfully requested.

35 USC § 103 Rejections

Response to Examiner's point 5

Examiner rejects claim 34 on the grounds that it is unpatentable over Izumiyama. Applicant respectfully cancels claim 34.

Response to Examiner's point 6

Examiner rejects claims 1-4, 7-8, 12-13, and 18 as unpatentable over McKay in view of Zourntos. Applicant respectfully submits that the invention disclosed in the current application is in fact not obvious from McKay and Zourntos, and traverses the Examiner's objections, in light of the comments below.

McKay teaches a method for signal enhancement in a "wireless communication system" (claim 1). It is clear, however, from the specification that by "wireless communication system," McKay refers only to a cellular phone network, and furthermore, McKay does not provide enablement for any wireless communication system other than a cellular phone system. For example, McKay states (paragraph 0013),

> *For example, the enhancement is the increase of signal power levels to allow cellular telephone usage where the original cellular signals are weak and the area or space that may benefit from improved coverage is relatively small compared to the coverage of a macro base station.*

Furthermore, he states (paragraph 0089),

> *Mobile positioning is an important emerging requirement for mobile wireless phone systems. The Federal Communications Commission (FCC) of the USA adopted a ruling in June 1996 (Docket no. 94-102) that requires all mobile network operators to provide location information on all calls to '911', the emergency services or so called E911 capability.*

Providing for improved ability to locate the source of a call to emergency services makes sense only in the specific context of a cellular telephone network, but not in the general context of any wireless communication environment.

In contrast, the present invention is specifically designed and enabled for use in *any* wireless environment. For example, the specification of the present invention states (paragraph 0038),

> *It is also in the scope of the present invention wherein the antenna assembly as defined above, is characterized by the fact that while one master CWS is busy with an on-going session, selected from any fax, voice, data transaction or any combination thereof, another CWS is used as the coordinating master,*

and furthermore (paragraph 0064),

> *This invention allows <u>any fixed or portable device</u> to adjust the phased array switching antenna beam directly to the source of the communication and calculate the exact power needed to reach the desired destination with the included equations"; that is to say, the present invention is enabled for any wireless communication network, not necessarily a cellular telephone network.*

Figures 7 and 8 of the present disclosure also illustrate embodiments in which the wireless network comprises inter alia computers, faxes, modems, and printers in addition to cellular telephones. Thus, while McKay teaches a wireless communication system that is specifically adapted to cellular telephone communication, the present invention teaches a wireless communication system that is applicable to any wireless environment.

There is a second fundamental difference between the invention disclosed by McKay and that disclosed in the present application. McKay teaches a specific polarization scheme. As exemplified in Fig. 17 and paragraph 0090 of McKay (cited by the Examiner),

> *FIG. 17 illustrates a flat panel enhancer unit 200 constructed in accordance with another exemplary embodiment of the present invention. The unit 200 includes a housing 201, which contains the circuitry (not illustrated) of the enhancer unit 200. The housing 201 has a top side or edge 202, a pair of sides or side edges 203 and 204 and a bottom side or side edge 205. The donor antenna 172 can include a symmetrical array of four (4) patches 206, 207, 208 and 209, with each patch dual polarized (see FIG. 36) to provide the receive portion 174 and the transmit portion 190 orthogonal to one another.*

That is to say, McKay teaches the sole case in which the transmit and receive portions are linearly polarized and orthogonal to one another. Furthermore, McKay teaches (paragraph 0086) that

> *A first server antenna 180 having a characteristic polarization portion 182 is cross-polarized relative to the donor antenna characteristic polarization 174 and is horizontally polarized in this example. The antenna portion 180 can transmit the amplified downlink signal F2 to the user. A person of ordinary skill in the art will*

> *know that a second polarization that is cross-polarized relative to a first characteristic polarization has an orthogonal polarization characteristic relative to the first characteristic polarization.*

In the invention disclosed by McKay, such cross-polarization is a necessary feature of the device. In contrast, the present invention teaches that the device may be used with *any* polarization desired by the user. Thus, in paragraph 0040, the present invention discloses that

> *It is still according to the main core of the present invention, wherein the aforementioned antenna assembly comprises a phased array antenna. Said antenna is comprised of n by m elements with horizontal-vertical and circular polarization.*

In paragraph 0047, the present invention teaches "an array of n by m elements with horizontal-vertical and or circular polarization." Most especially, in paragraph 0092 of the present application, referring to the phased array antenna shown pictorially in Fig. 9, it is stated that

> *Although the block diagram is drawn for four horizontal elements, it represents a general form of n by m antenna elements, which will be realized according to changing needs in different CWS masters. It is acknowledged that according to one embodiment of the present invention, the antenna element is a basic radiating/receiving element and could be configured to horizontal/vertical/circular polarization.*

Thus, in contrast to McKay, which teaches only a specific polarization configuration, the present invention does not require any particular polarization for enablement.

As in the case of McKay, there are fundamental and non-obvious technological differences between the invention disclosed in the present patent application and that of Zourntos. The Examiner cites Zourntos as teaching memory queue for the antenna array (paragraph 0127). Zourntos teaches (paragraph 0127), "All nodes must have access to some memory to queue packets waiting for transmission, to store data that has been interleaved across

several packets, and to store control information used by the DSP." The method by which memory access is provided to the nodes, and indeed the basic principles by which the network is constructed as taught by Zourntos, are completely different from those disclosed in the present invention. Claim 1 of Zourntos teaches

> *A wireless communication network comprising: (a) a plurality of network nodes, each network node including a node beamforming antenna array for establishing a spatial communication channel; (b) a central router in communication with each of said network nodes, said central router comprising: (i) a memory; and (ii) a processor coupled to said memory such that said processor executes instructions stored in memory for selectively activating at least one network node of said plurality of network nodes such that each activated network node has a transmission neighbourhood and such that each said node beamforming antenna array of each said activated network node is utilized to establish a first two way spatial communication channel.*

This central router is also taught in the specification of Zourntos. In paragraphs 0005 – 0007, the router is described as

> *a central router in communication with each of said network nodes, said central router comprising:*
> *(i) a memory; and*
> *(ii) a processor coupled to said memory such that said processor executes instructions stored in memory for selectively activating at least one network node of said plurality of network nodes such that each activated network node has a transmission neighbourhood and such that each said node beamforming antenna array of each said activated network node is utilized to establish a first two way spatial communication channel.*

Zourntos further teaches (paragraph 0113) that

> *The router is a computer and signal processing engine which interfaces to the network through wired or optical means alone (i.e., it does not have the ability to transmit data wirelessly). It oversees the operation of the network, executing the software functions of the various layers in the invention. It is also capable of programming the beamforming and communication processors of the matrix nodes (thus reducing or eliminating the need for processing capability needed at the MNs*

themselves). It may collect data received by a matrix node and manipulate it. For example, it may perform direction-of-arrival estimation on behalf of any fixed element. The router exerts its control over the network via the control channel, which, as mentioned, includes a "web" of wireless links permeating the network. Thus it is capable of sending data to, or receiving information from, any individual node.

That is, all memory functions are performed by the router. Figure 2 of Zourntos illustrates

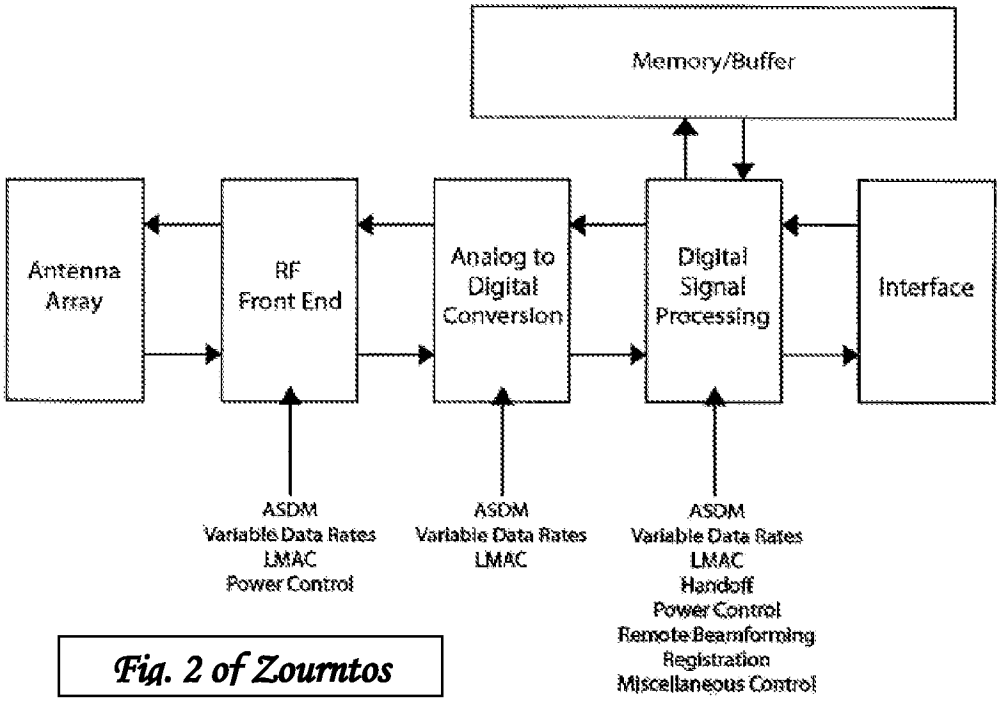


Fig. 2 of Zourntos

that Zourntos teaches that the antenna array itself is a simple node, and that the allocation of memory is determined solely by the router. Indeed, Zourntos teaches (paragraph 0277) that

All beamforming in the invention is done remotely using data collected at the node of interest, which, to the authors' knowledge, is novel. Essentially, the intensive calculations required in the calculation of beamforming weights are done at a single centralized processor in the router. This reduces the cost and complexity of the matrix nodes and user modules, and conserves battery life.

Thus, Zourntos teaches a memory queue in which *all memory functions and all network controls are performed at a central router, with each antenna being a simple node.*

In contrast to Zourntos, the present invention teaches an antenna network in which each antenna is self-contained and no network service is needed (i.e. there is no necessity for the central router taught by Zourntos). The present disclosure teaches (paragraph 0029) that "Said antenna design comprises the following three components: micro-strip small-size antenna, switching device and a controller." The controller is defined (paragraph 0031) as comprising "coordinating means and a suitable memory." That is, unlike Zourntos, in which the antenna is a simple node, and all memory functions are performed externally to the antenna by a central router, the present invention discloses a device in which the antenna is a self-contained smart node in which the memory is located within the node, and in which the memory queue occurs at the node.

Since the present invention teaches technology neither taught nor implied by McKay, namely, (a) enablement in *any wireless environment* rather than specifically for a cellular telephone network and (b) enablement with *any polarization desired by the user* rather than specifically for linear polarization with two orthogonal polarizations; and furthermore, since the present invention teaches a method of networking neither taught nor implied by Zourntos, namely, the use of "smart" nodes in which the memory (and hence memory queue) is contained within the antenna, rather than "simple" nodes in which all memory functions are performed by and at a central router, the Applicants respectfully submit that the present invention is non-obvious and patentable over McKay and Zourntos and that the differences between the present invention and the prior as heretofore described are sufficiently great to traverse the Examiner's objections. Furthermore, the Applicants respectfully submit that since the present invention differs in principle from those taught by McKay and Zourntos individually, as heretofore described, the present invention is non-obvious and patentable over any combination of McKay and Zourntos.

Regarding the Examiner's comments regarding specific claims:

The Examiner rejects claims 3-4 of the present invention on the grounds that McKay also discloses the use of a multiple antenna array for indoor applications. The Applicants respectfully submit that these claims should be allowed as entered in light of the discussion above.

Improvement of a signal in a wireless environment has to be either indoors or outdoors. Coincidentally, both McKay and the present invention present attempts at solving the problem for an indoor environment. As argued above, and will be argued further below, the approach to solving the problem taken in the present invention is different from, and an improvement over, that taken by McKay. Therefore, the Applicants respectfully submit that in light of the non-obviousness in general of the present invention relative to McKay, the invention should be patentable for any wireless environment, including the indoor environment of claims 3 and 4.

The Examiner rejects claim 7 on the grounds that McKay as modified by Zourntos discloses an indoor antenna array assembly for relaying signals to the indoor mobile. As argued above, McKay uses the term "mobile" to refer to a cellular (mobile) telephone, while in the present invention, "mobile" refers generically to any wireless device. Further, as argued above, the Applicant respectfully submits that the non-obviousness of the present invention makes it patentable over McKay and Zourntos. Nonetheless, in order to remove the ambiguity of the claim, it has been amended to read "wireless station" instead of "mobile." Literal support for this change can be found inter alia in paragraph 0017 of the specification, in which "station" and "mobile" are used synonymously.

The Examiner rejects claim 12 on the grounds that McKay as modified by Zourntos teaches an indoor antenna/smart antenna system is known installed as a CWS. As explained above, Zourntos does not teach a smart antenna system. Furthermore, neither McKay nor Zourntos makes *any* reference to a CWS or any method by which the antenna system will be an integral part of the building's construction. In contrast, the present invention discloses a CWS that *is* integrated into the building's construction (e.g. "said CWS is a wall-installed unit," paragraph 0086). In the present invention, unlike those of McKay and Zourntos, it is anticipated that the cost will be sufficiently low (under $10/unit, paragraph 0064) that it more cost-effective to install the antenna array in the building and reconstruct it in the case of a move to a different building than it would be to carry the array to a new location, which is required by the setups described by McKay and Zourntos.

The Examiner rejects claim 13 on the grounds that McKay discloses a signal enhancer for a common network. The Applicants respecfully submit that since, as argued above, McKay specifically teaches a cellular phone network, while the present invention teaches a network that can be used in any wireless environment, the above arguments traverse the Examiner's rejection. As originally submitted, claim 13 contained a typographical error ("previous" for "dependent"); the claim has been amended to correct the error.

The Examiner rejects claim 18 on the grounds that McKay as modified by Zourntos teaches an indoor antenna array assembly of $n \times m$ elements. As discussed in detail above, McKay teaches only the case of cross-polarization, while the present invention (cf. paragraphs 0040 and 0047 of the specification) allows any polarization chosen by the user. Since the invention disclosed by McKay cannot be adapted to any arbitrary polarization, the use of any polarization chosen by the user is non-obvious, and therefore, the Applicants respectfully submit that the Examiner's objection to claim 18 has been traversed. The claim has been amended to remove any ambiguity by specifically referring to "any polarization chosen by the user." Literal support for this amendment can be found in paragraphs 0040 and 0047 of the specification.

In view of the foregoing amendments and remarks, the pending claims (1-4, 7-8, 12-13, and 18) are deemed to be allowable. Their favorable reconsideration and allowance is respectfully requested.

Response to Examiner's points 7 and 8

The examiner rejects claims 5, 21, and 22 as being unpatentable over McKay in view of Zourntos and further in view of Rappaport. The Examiner argues that it would have been obvious to modify McKay with the path loss equation disclosed by Rappaport in order to obtain an optimized calculation of signal propagation under the conditions of use of the present invention. As discussed above, McKay discloses a device with specific polarization conditions. Claim 5 includes a path loss equation derived from extensive experimentation, and has been shown accurately to describe the propagation of electromagnetic radiation under the conditions of use of the device disclosed in the present invention. One cannot assume that the propagation

equation developed specifically for the conditions under which the present invention is used (e.g. arbitrary polarization) could have been derived from different conditions (e.g. cross-polarization).

More significantly, the Applicants respectfully submit that modifying McKay with Rappaport would not obviously lead to the present invention for the simple reason that Rappaport does not apply to the conditions under which the present invention is intended to be used. Yarkoni and Blaunstein (*Prog. Electromagnetics Res.* **2006**, *59*, 151-174) performed an extensive analysis of signal propagation in indoor environments. With specific reference to the signal propagation model of Rappaport, they concluded

> *Rappoport's model. . . does not provide the radiowave propagation characteristic such as the attenuation inside buildings in situations when the transmitter and the receiver are located at the different floors. Moreover, the Rappaport's model. . . does not provide any characterization of the path loss between floors* (p. 163).

Yarkoni and Blaunstein further note that in order to use Rappaport's model,

> *. . . we need information about measurements at every floor. . . . Therefore, the Rappaport's model should be used in cases where only buildings with a low number of floors (up to two floors) exist. . . . Further more, in his empirical model, Rappaport used a term X_σ which was evaluated from special experiments that take into account only the effects of floors. Rappaport doesn't take into account effects of corners, walls and windows. . .* (p. 164).

Thus, Rappaport's model has been shown *empircally to be invalid*. Since Rappaport's model is invalid, any calculations made therefrom will almost certainly be incorrect as well. This means that even if McKay were modified with Rappaport, there would still be no enablement, as the device thus constructed would not work. If McKay modified with Rappaport cannot produce a working device, while the present device is based on a model that has been shown experimentally to be valid, there can be no issue of obviousness. The Examiner cites McKay as modified by Zourntos and Rappaport for obtaining an "optimized calculation." In this context, it is important to note that when Zourntos teaches an "optimum path," he specifically teaches an optimum *network* path. Thus, Zourntos teaches (paragraph 0478),

> *This function allows modules spread far apart within a fixed element network to communicate efficiently with one another via a route planned by the router. The*

> *router determines the optimal path of matrix nodes needed to wirelessly connect a number of spatially disparate devices.*

Zourntos further teaches (paragraph 0712),

> *The receiving modules use the link code to relay the data along the network (matrix node-to-matrix node) until the destination module is reached. The router keeps track of the location of each device in the network and can trace an optimal path between source and destination(s).*

Thus, Zourntos quite explicitly restricts the meaning of the term "optimal path" to the optimal network path for transfer of information. In contrast, the present device teaches "optimal path" as the optimal *signal* path for the RF signal itself (paragraph 0031): "The said memory queue records the optimal path in each indoor environment to each of the associated nodes to said antenna assembly." Thus, the invention disclosed by Zourntos cannot be used to teach optimal *signal* path calculations of the sort used by the present invention.

The Applicants respectfully submit that the above remarks traverse the Examiner's objections, and therefore that claims 5, 6, 11, 21, and 22 are deemed to be allowable. Their favorable reconsideration and allowance is respectfully requested.

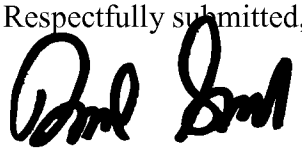
Allowable Subject Matter

The Examiner has allowed claims 9-10 in principle but objects to them as they are based on a rejected claim. The Applicants respectfully submit that the arguments and remarks above traverse the Examiner's rejection of the claims upon which claims 9 and 10 are based, and therefore respectfully request that they be allowed as originally entered.

Should the Examiner have any question or comment as to the form, content or entry of this Amendment, the Examiner is requested to contact the undersigned at the telephone number below. Similarly, if there are any further issues yet to be resolved to advance the prosecution of this application to issue, the Examiner is requested to telephone the undersigned counsel.

Favorable action on this amendment is courteously solicited.

Respectfully submitted,



Daniel J. Swirsky
Agent for Applicant(s)
Reg. No. 45,148

Dated: February 13, 2008

ALPHAPATENT ASSOCIATES LTD.
55 REUVEN ST.
BEIT SHEMESH, ISRAEL 99544
TEL. (US) 516-620-4573
FAX. (US) 206-374-6672
dswirsky@alphapatent.com